

**SUBJECT:** Guarding of Belts and Pulleys

**Purpose:** To clarify and provide enforcement guidelines for belt and pulley power transmission apparatus.

**Scope:** This instruction applies MNOSHA-wide.

**References:** 29 CFR 1910.219, Mechanical Power Transmission Apparatus  
ANSI A11.1, Safety Standard for Industrial Lighting  
ANSI B15.1, Safety Standard for Mechanical Power Transmission Apparatus  
ANSI B20.1, Safety Standard for Conveyors and Related Equipment

**Cancellation:** This instruction supersedes STD 1-12.19, "Guarding of Belts and Pulleys" dated 9/20/2006.

**Background:** 29 CFR 1910.219 establishes the requirements for guarding the components of mechanical power transmission apparatuses. Guarding requirements were first established with the adoption of ANSI B15.1-1953 (R-1958), which was subsequently incorporated by reference under 29 CFR 1910.6(e)(16). Section 2.0 of ANSI B15.1 defines a *mechanical power transmission apparatus* as "the mechanical components which, together with a source of power, provide the motion to an element of a machine or equipment". Although the various sections of 29 CFR 1910.219 address the various components of mechanical power transmission apparatuses, this directive is limited to the applicability of 29 CFR 1910.219 to the "pulleys" and "belts" components.

This directive provides enforcement guidance for MN OSHA investigators in evaluating the unique considerations involving belts and pulleys. First, the ingoing nip-point hazard posed is the result of the interaction of a pulley and a belt, each of which are addressed separately under different sections of 29 CFR 1910.219 (1910.219(d) and 1910.219(e), respectively), and provides reconciliation in citing one hazard regulated under two sections of the standard. Second, this directive clarifies the varying requirements for the different categories of belts. Finally, the directive acknowledges alternative requirements for specific conditions found in special industries.

**GENERALLY:**

1910.219(a)(1) requires that all power transmission belts and pulleys be guarded with the exception of the following when operating at a speed of 250 feet per minute or less:

- a. Flat belts measuring 1 inch or less in width;
- b. Flat belts measuring 2 inches or less in width and having no metal lacings or fasteners;
- c. Round belts measuring ½ inch or less in diameter;
- d. Single strand V-belts measuring a width of 13/32 inch or less

1910.219(m) requires that standard guards shall consist of expanded metal, perforated or solid sheet metal, wire mesh on a frame of angle iron, or iron pipe; are securely fastened to either the floor or frame of the machine; and are free from burrs and sharp edges.

1910.219(o)(2) provides that wood guards shall not be used, except for the following industries:

- a. Woodworking;
- b. Chemical industries;
- c. Industries where the presence of fumes or manufacturing conditions would cause the rapid deterioration of metal guards.

- d. Construction work and locations outdoors where extreme cold or extreme heat makes metal guards/railings undesirable.

1910.219(o)(3)(iii) requires:

- a. Suitable reinforcement be provided to safely sustain the weight and stress imposed by a guard;
- b. Interior surfaces of all guards where the belt will come in contact shall be smooth and free from all projections;
- c. Overhead belt guards shall be at least 1/4 of the belt-width, or 6 inches, wider than the belt that the guard is designed to protect.

#### PULLEYS:

1910.219(d)(1) requires all pulleys to be guarded in conformance with 1910.219(m) and 1910.219(o) if any parts of the pulleys are 7 feet or less from floor level. An exception is provided for "pulleys serving as balance wheels", whereby the pulley may be guarded with a disk covering the spokes if the point of contact between the belt and pulley is more than 6 feet 6 inches from the floor level.

#### HORIZONTAL BELTS:

1910.219(e)(1) requires all horizontal belts-to be guarded as follows:

- a. If *both runs* of the horizontal belt are between 42 inches and 7 feet from floor level, the guard must extend at least 15 inches above the belt or to a standard height.
- b. If *both runs* of the horizontal belt are 42 inches or less from floor level, the belt shall be fully enclosed in accordance with 1910.219(m) and 1910.219(o).

#### OVERHEAD HORIZONTAL BELTS:

1910.219(e)(2)(i) requires that if any of the lower parts of overhead horizontal belts are 7 feet or less from floor level, they shall be guarded on the sides and bottom in accordance with 1910.219(o)(3).

1910.219(e)(2)(ii) requires horizontal overhead belts that are 7 feet or more above the floor-level or platform to be guarded for their entire length if the following conditions are met:

- a. If the horizontal belt is located over a passageway or workplace, AND travels at least 1,800 feet per minute;
- b. If the center-to-center distance between the pulleys is 10 feet or more;
- c. If the belt is 8 inches or more in width.

#### VERTICAL AND INCLINED BELTS:

1910.219(a)(2) provides that vertical and inclined belts may be guarded with only a nip-point belt and pulley guard only if:

- a. Belts are not more than 2-1/2 inches wide;
- b. Belts run at a speed of less than 1,000 feet per minute; and
- c. Belts are free from metal lacings or fastenings.

1910.219(e)(3)(i) requires vertical and inclined belts which do not meet the criteria set forth in 1910.219(a)(2) to be enclosed by a guard in accordance with 1910.219(m) and 1910.219(o). Only the portion of a belt seven (7) feet or less from the floor is required to be enclosed by a guard (See OSHA Instruction STD 1-12-014 dated October 30,1978).

#### OVERHEAD VERTICAL AND INCLINED BELTS:

1910.219(e)(3)(ii) requires that guards for inclined belts be arranged to ensure that all unguarded moving parts of the belt and pulley are at least 7 feet from floor level.

1910.219(e)(4) requires overhead vertical belts, which run over a lower pulley that is more than 7 feet above the floor level, to be guarded for the entire length at the bottom if the following conditions are met:

- a. If the horizontal belt is located over a passageway or, AND travels at least 1,800 feet per minute;
- b. If the belt is 8 inches or more in width.

SPECIAL INDUSTRIES:

1910.219(a)(3) requires that only the sides and face sections of nip-point belt and pulley are to be guarded for belts and pulleys in the **textile industry**, so long as the guards:

- a. Extend at least 6 inches beyond the rim of the pulley on the in-running and off-running sides of the belt; and
- b. Extend at least 2 inches away from the rim and face of the pulley in all other directions.

1910.219(c)(5) requires **power transmission** belts and pulleys to be guarded when located in basements, towers, or rooms used exclusively for power transmission. When there is no employee exposure to power transmission belts because they are naturally guarded by location, then no enclosure or guarding is required (See OSHA Instruction STD 1-12.14 dated October 30, 1978), so long as the following conditions are met:

- a. The basement, tower, or exclusive room is locked against unauthorized entrance;
- b. There is a clearance of at least 5 feet 6 inches between the floor-level AND the power transmission beams, ceiling and any other objects;
- c. The lighting conforms with ANSI A11.1-1965 (R-1970).
- d. The route followed by the oiler is protected.

1910.219(e)(1)(ii) provides that for horizontal belts located in **power-plants** or power-development rooms, a guardrail may be used in lieu of guarding required by 1910.219(e)(1)(i).

1910.261(f)(4) requires that all conveyor drive belts and pulleys used in rag and old paper preparation in **pulp, paper and paperboard mills** be fully enclosed or, if open and within 7 feet of floor level, shall be constructed and guarded in accordance with 1910.261(c)(15), ANSI B15.1 (1953) and ANSI B20.1 (1957).

1910.261(j)(2) requires that all pulp-conveyor drive belts and pulleys in **pulp, paper and paperboard mills** be fully enclosed or, if open and within 7 feet of floor level, shall be constructed and guarded in accordance with ANSI B20.1 (1957).

1910.263(e)(1)(i) requires that all **bakery** mixers with external power application shall have all belts and pulleys completely enclosed.

ACTION:

- A. Citations for violations of belt and pulley standards will be issued using a grouped SAVE that combines 1910.219(d)(1) and the applicable section(s) of 1910.219(e).
- B. On machines such as Bridgeport mills, the belts do not need to be guarded if the pulley is guarded so that there is no ingoing nip point hazard.
- C. On machines in the textile industry, such as light and medium-duty sewing machines, the drive wheels and belts below the table shall be fully enclosed, but the belt and wheel above the table do not need to be fully enclosed if the guards the following criteria (See OSHA Instruction STD 1-12-019 dated October 30,1978):
  - a. When the belt and wheel are in motion, hands are not placed in the wheel, nip point or belt area.

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- b. Distance between the point where the operator is holding material with both hands and the belt area is sufficient to prevent any part of the operator's body from being exposed to danger.
  - c. The table top is arranged or of such size to prevent any other employee, passing by or working adjacent to the wheel or belt, from being exposed.
  - d. There is no past history of injuries.
- D. Belts and pulleys that meet the requirements outlined in a more recent version of ANSI B15.1 shall be deemed acceptable.

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